

Exhibit 2

**U.S. Food and Drug Administration**Department of
Health and
Human Services**CENTER FOR FOOD SAFETY AND APPLIED NUTRITION**[FDA Home Page](#) | [CFSAN Home](#) | [Search/Subject Index](#) | [Q & A](#) | [Help](#)

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Approximate pH of Foods and Food products

The pH and/or acidity of a food are generally used to determine processing requirements and the applicability of GMP regulations for regulatory purposes. Methods and conditions for determining the pH and acidity of foods are also summarized in 21 CFR 114.90. Methodology for pH is generally available from pH meter and electrode manufacturers.

To assist readers in determining the product pH levels, the approximate ranges of pH values are compiled below. Considerable variation exists between varieties, condition of growing and processing methods, etc. Data is presented for the edible portion of foods in their normal and natural state, unless otherwise designated. We solicit your input to this matter. This list will be updated when new information is available. Please contact the LACF Coordinator by phone at 301-436-2411 or email to lacf@cfsan.fda.gov.

Item	Approximate pH
Abalone	6.10 - 6.50
Abalone mushroom	5.00 -
Ackees	5.50
Aloe vera	6.10
Aloe Juice	6.00 - 6.80
Anchovies	6.50
Anchovies, stuffed w/capers, in olive oil	5.58
Antipesto	5.60 -
Apple, baked with sugar	3.20 - 3.55
Apple, eating	3.30 - 4.00
Apples	
Delicious	3.90
Golden Delicious	3.60
Jonathan	3.33
McIntosh	3.34
Juice	3.35 - 4.00
Sauce	3.10 - 3.60
Winesap	3.47
Apricots	3.30 - 4.80

Canned	3.40 - 3.78
Dried, stewed	3.30 - 3.51
Nectar	3.78
Pureed,	3.42 - 3.83
Strained	3.72 - 3.95
Arrowroot Crackers	6.63 - 6.80
Arrowroot Cruel	6.37 - 6.87
Artichokes	5.50 - 6.00
Artichokes, canned, acidified	4.30 - 4.60
Artichokes, French, cooked	5.60 - 6.00
Artichokes, Jerusalem, cooked	5.93 - 6.00
Asparagus	6.00 - 6.70
Buds	6.70
Stalks	6.10
Asparagus, cooked	6.03 - 6.16
Asparagus, canned	5.00 - 6.00
Asparagus, frozen, cooked	6.35 - 6.48
Asparagus, green, canned	5.20 - 5.32
Asparagus, strained	4.80 - 5.09
Avocados	6.27 - 6.58
Baby corn	5.20 -
Baby Food Soup, unstrained	5.95 - 6.05
Bamboo Shoots +	5.10 - 6.20
Bamboo Shoots, preserved	3.50 - 4.60
Bananas	4.50 - 5.20
Bananas, red	4.58 - 4.75
Banana, yellow	5.00 - 5.29
Barley, cooked	5.19 - 5.32
Basil pesto	4.90
Bass, sea, broiled	6.58 - 6.78
Bass, striped, broiled	6.50 - 6.70
Beans	5.60 - 6.50
Black	5.78 - 6.02
Boston style	5.05 - 5.42
Kidney	5.40 - 6.00
Lima	6.50
Soy	6.00 - 6.60
String	5.60

Wax	5.30 - 5.70
Beans, pork & tomato sauce, canned	5.10 - 5.80
Beans, refried	5.90
Beans, vegetarian, tomato sauce, canned	5.32
Beets	5.30 - 6.60
Beets, cooked	5.23 - 6.50
Beets, canned, acidified	4.30 - 4.60
Beets, canned	4.90 - 5.80
Beets, chopped	5.32 - 5.56
Beets, strained	5.32 - 5.56
Bird's nest soup	7.20 - 7.60
Blackberries, Washington	3.85 - 4.50
Blueberries, Maine	3.12 - 3.33
Blueberries, frozen	3.11 - 3.22
Bluefish, Boston, filet, broiled	6.09 - 6.50
Bran	
Flakes	5.45 - 5.67
All Bran	5.59 - 6.19
Bread, white	5.00 - 6.20
Bread, Boston, brown	6.53
Bread, Cracked wheat	5.43 - 5.50
Bread, pumpernickel	5.40 -
Bread, Rye	5.20 - 5.90
Bread, whole wheat	5.47 - 5.85
Breadfruit, cooked	5.33
Broccoli, cooked	6.30 - 6.52
Broccoli, frozen, cooked	6.30 - 6.85
Broccoli, canned	5.20 - 6.00
Brussels sprout	6.00 - 6.30
Buttermilk	4.41 - 4.83
Cabbage	5.20 - 6.80
Green	5.50 - 6.75
Red	5.60 - 6.00
Savoy	6.30
White	6.20
Cactus	4.70
Calamary (Squid)	5.80
Cantaloupe	6.13 - 6.58

Capers	6.00
Carp	6.00
Carrots	5.88 - 6.40
Carrots, canned	5.18 - 5.22
Carrots, chopped	5.30 - 5.56
Carrots, cooked	5.58 - 6.03
Carrots, pureed	4.55 - 5.80
Carrots, strained	5.10 - 5.10
Cauliflower	5.60
Cauliflower, cooked	6.45 - 6.80
Caviar, American	5.70 - 6.00
Celery	5.70 - 6.00
Celery, cooked	5.37 - 5.92
Celery Knob, cooked	5.71 - 5.85
Cereal, strained	6.44 - 6.45
Chayote (mirliton), cooked	6.00 - 6.30
Cheese, American, mild	4.98
Cheese, Camembert	7.44
Cheese, Cheddar	5.90
Cheese, Cottage	4.75 - 5.02
Cheese, Cream, Philadelphia	4.10 - 4.79
Cheese Dip	5.80
Cheese, Edem	5.40
Cheese, Old English	6.15
Cheese, Roquefort	5.10 - 5.98
Cheese, Parmesan	5.20 - 5.30
Cheese, Snippy	5.18 - 5.21
Cheese, Stilton	5.70
Cheese, Swiss Gruyere	5.68 - 6.62
Cherries, California	4.01 - 4.54
Cherries, frozen	3.32 - 3.37
Cherries, black, canned	3.82 - 3.93
Cherries, Maraschino	3.47 - 3.52
Cherries, red, Water pack	3.25 - 3.82
Cherries, Royal Ann	3.80 - 3.83
Chicory	5.90 - 6.05
Chili Sauce, acidified	2.77 - 3.70
Chives	5.20 - 6.31

Clams	6.00 - 7.10
Clam Chowder, New England	6.40
Coconut, fresh	5.50 - 7.80
Coconut milk	6.10 - 7.00
Coconut preserves	3.80 - 7.00
Codfish, boiled	5.30 - 6.10
Cod liver	6.20
Conch	7.52 - 8.40
Congee	6.40
Corn	5.90 - 7.30
Corn, canned	5.90 - 6.50
Corn Flakes	4.90 - 5.38
Corn, frozen, cooked	7.33 - 7.68
Corn, Golden Bantam, cooked on cob	6.22 - 7.04
Crab meat	6.50 - 7.00
Crabapple Jelly, corn	2.93 - 3.02
Cranberry Juice, canned	2.30 - 2.52
Crabmeat, cooked	6.62 - 6.98
Cream, 20 per cent	6.50 - 6.68
Cream, 40 per cent	6.44 - 6.80
Cream of Asparagus	6.10
Cream of Coconut, canned	5.51 - 5.87
Cream of Potato soup	6.00
Cream of Wheat, cooked	6.06 - 6.16
Chrysanthemum drink	6.50
Cucumbers	5.12 - 5.78
Cucumbers, Dill pickles	3.20 - 3.70
Cucumbers, pickled	4.20 - 4.60
Curry sauce	6.00
Curry Paste, acidified	4.60 - 4.80
Cuttlefish	6.30
Dates, canned	6.20 - 6.40
Dates, Dromedary	4.14 - 4.88
Dungeness Crab Meat	
Eggplant	5.50 - 6.50
Eggs, new-laid, whole	6.58
White	7.96
Yolk	6.10

Eell	6.20
Escarolle	5.70 - 6.00
Enchalada sauce	4.40 - 4.70
Fennel (Anise)	5.48 - 5.88
Fennel, cooked	5.80 - 6.02
Figs, Calamyrna	5.05 - 5.98
Figs, canned	4.92 - 5.00
Flounder, boiled	6.10 - 6.90
Flounder, filet, broiled	6.39 - 6.89
Four bean salad	5.60
Fruit cocktail	3.60 - 4.00
Garlic	5.80
Gelatin Dessert	2.60
Gelatin, plain jell	6.08
Gherkin	
Ginger	5.60 - 5.90
Ginseng , Korean drink	6.00 - 6.50
Gooseberries	2.80 - 3.10
Graham Crackers	7.10 - 7.92
Grapes, canned	3.50 - 4.50
Grapes, Concord	2.80 - 3.00
Grapes, Lady Finger	3.51 - 3.58
Grapes, Malaga	3.71 - 3.78
Grapes, Niagara	2.80 - 3.27
Grapes, Ribier	3.70 - 3.80
Grapes, Seedless	2.90 - 3.82
Grapes, Tokyo	3.50 - 3.84
Grapefruit	3.00 - 3.75
Grapefruit, canned	3.08 - 3.32
Grapefruit Juice, canned	2.90 - 3.25
Grass jelly	5.80 - 7.20
Greens, Mixed, chopped	5.05 - 5.22
Greens, Mixed, strained	5.22 - 5.30
Grenadine Syrup	2.31
Guava nectar	5.50
Guava, canned	3.37 - 4. 10
Guava Jelly	3.73
Haddock, Filet, broiled	6.17 - 6.82

Hearts of Palm	5.70
Herring	6.10
Hominy, cooked	6.00 - 7.50
Honey	3.70 - 4.20
Honey Aloe	4.70
Horseradish, freshly ground	5.35
Huckleberries, cooked with sugar	3.38 - 3.43
Jackfruit	4.80 - 6.80
Jam, fruit	3.50 - 4.50
Jellies, fruit	3.00 - 3.50
Jujube	5.20 -
Junket type Dessert:	
Raspberry	6.27
Vanilla	6.49
Kale, cooked	6.36 - 6.80
Ketchup	3.89 - 3.92
Kippered, Herring, Marshall	5.75 - 6.20
Herring, Pickled	4.50 - 5.00
Kelp	6.30
Kumquat, Florida	3.64 - 4.25
Leeks	5.50 - 6.17
Leeks, cooked	5.49 - 6.10
Lemon Juice	2.00 - 2.60
Lentils, cooked	6.30 - 6.83
Lentil Soup	5.80
Lettuce	5.80 - 6.15
Lettuce, Boston	5.89 - 6.05
Lettuce, Iceberg	5.70 - 6.13
Lime Juice	2.00 - 2.35
Lime	2.00 - 2.80
Lobster bisque	6.90 -
Lobster soup	5.70
Lobster, cooked	7.10 - 7.43
Loganberries	2.70 - 3.50
Loquat (May be acidified to pH 3.8)	5.10
Lotus Root	6.90 -
Lychee	4.70 - 5.01
Macaroni, cooked	5.10 - 6.41

Mackerel, King, boiled	6.26 - 6.50
Mackerel, Spanish, broiled	6.07 - 6.36
Mackerel, canned	5.90 - 6.40
Mangoes, ripe	3.40 - 4.80
Mangoes, green	5.80 - 6.00
Mangostine ?	4.50 - 5.00
Maple syrup	5.15
Maple syrup, light (Acidified)	4.60
Matzos	5.70
Mayhaw (a variety of strawberry)	3.27 - 3.86
Melba Toast	5.08 - 5.30
Melon, Casaba	5.78 - 6.00
Melons, Honey dew	6.00 - 6.67
Melons, Persian	5.90 - 6.38
Milk, cow	6.40 - 6.80
Milk, Acidophilus	4.09 - 4.25
Milk, condensed	6.33
Milk, evaporated	5.90 - 6.30
Milk, Goat's	6.48
Milk, peptonized	7.10
Milk, Sour, fine curd	4.70 - 5.65
Milkfish	5.30
Mint Jelly	3.01
Molasses	4.90 - 5.40
Muscadine (A variety of grape)	3.20 - 3.40
Mushrooms	6.00 - 6.70
Mushrooms, cooked	6.00 - 6.22
Mushroom Soup, Cream of, canned	5.95 - 6.40
Mussels	6.00 - 6.85
Mustard	3.55 - 6.00
Nata De Coco	5.00
Nectarines	3.92 - 4.18
Noodles, boiled	6.08 - 6.50
Oatmeal, cooked	6.20 - 6.60
Octopus	6.00 - 6.50
Okra, cooked	5.50 - 6.60
Olives, black	6.00 - 7.00
Olives, green, fermented	3.60 - 4.60

Olives, ripe	6.00 - 7.50
Onions, pickled	3.70 - 4.60
Onions, red	5.30 - 5.80
Onion white	5.37 - 5.85
Onions, yellow	5.32 - 5.60
Oranges, Florida	3.69 - 4.34
Oranges, Florida "color added"	3.60 - 3.90
Orange Juice, California	3.30 - 4.19
Orange, Juice Florida	3.30 - 4.15
Orange, Marmalade	3.00 - 3.33
Oysters	5.68 - 6.17
Oyster, smoked	6.00
Oyster mushrooms	5.00 - 6.00
Palm, heart of	6.70
Papaya	5.20 - 6.00
Papaya Marmalade	3.53 - 4.00
Parsley	5.70 - 6.00
Parsnip	5.30 - 5.70
Parsnips, cooked	5.45 - 5.65
Pate	5.90
Peaches	3.30 - 4.05
Peaches, canned	3.70 - 4.20
Peaches, cooked with sugar	3.55 - 3.72
Peaches, frozen	3.28 - 3.35
Peanut Butter	6.28
Peanut Soup	7.5
Pears, Bartlett	3.50 - 4.60
Pears, canned	4.00 - 4.07
Pears, Sickle cooked w/sugar	4.04 - 4.21
Pear Nectar	4.03
Peas, canned	5.70 - 6.00
Peas, Chick, Garbanzo	6.48 - 6.80
Peas, cooked	6.22 - 6.88
Peas, dried (split green), cooked	6.45 - 6.80
Peas, dried (split yellow), cooked	6.43 - 6.62
Peas, frozen, cooked	6.40 - 6.70
Peas, pureed	4.90 - 5.85
Pea Soup, Cream of, Canned	5.70

Peas, strained	5.91 - 6.12
Peppers	4.65 - 5.45
Peppers, green	5.20 - 5.93
Persimmons	4.42 - 4.70
Pickles, fresh pack	5.10 - 5.40
Pimiento	4.40 - 4.90
Pimento, canned, acidified	4.40 - 4.60
Pineapple	3.20 - 4.00
Pineapple, canned	3.35 - 4.10
Pineapple Juice, canned	3.30 - 3.60
Plum Nectar	3.45
Plums, Blue	2.80 - 3.40
Plums, Damson	2.90 - 3.10
Plums, Frozen	3.22 - 3.42
Plums, Green Gage	3.60 - 4.30
Plums, Green Gage, canned	3.22 - 3.32
Plums, Red	3.60 - 4.30
Plums, spiced	3.64
Plums, Yellow	3.90 - 4.45
Pollack, filet, broiled	6.72 - 6.82
Pomegranate	2.93 - 3.20
Porgy, broiled	6.40 - 6.49
Pork & Beans, rts.	5.70
Potatoes	5.40 - 5.90
Mashed	5.10
Prunes, dried, stewed	3.63 - 3.92
Sweet	5.30 - 5.60
Tubers	5.70
Potato Soup	5.90
Prune Juice	3.95 - 3.97
Prune, pureed	3.60 - 4.30
Prune, strained	3.58 - 3.83
Puffed Rice	6.27 - 6.40
Puffed Wheat	5.26 - 5.77
Pumpkin	4.90 - 5.50
Quince, fresh, stewed	3.12 - 3.40
Quince Jelly	3.70
Radishes, red	5.85 - 6.05

Radishes, white	5.52 - 5.69
Raisins, seedless	3.80 - 4.10
Rambutan (Thailand)	4.90
Raspberries	3.22 - 3.95
Raspberries, frozen	3.18 - 3.26
Raspberries, New Jersey	3.50 - 3.82
Raspberry Jam	2.87 - 3.17
Razor Clams	6.20
Razor shell (sea asparagus)	6.00
Rattan, Thailand	5.20 -
Red Ginseng	5.50
Red Pepper Relish	3.10 - 3.62
Rhubarb, California, stewed	3.20 - 3.34
Rhubarb	3.10 - 3.40
Canned	3.40
Rice (all cooked)	
Brown	6.20 - 6.80
Krispies	5.40 - 5.73
White	6.00 - 6.70
Wild	6.00 - 6.50
Rolls, white	5.46 - 5.52
Romaine	5.78 - 6.06
Salmon, fresh, boiled	5.85 - 6.50
Salmon, fresh, broiled	5.36 - 6.40
Salmon, Red Alaska, canned	6.07 - 6.16
Salsa	
Sardines	5.70 - 6.60
Sardine, Portuguese, in olive oil	5.42 - 5.93
Satay sauce	5.00
Sauce, Enchilada	5.50 -
Sauce, Fish	4.93 - 5.02
Sauce, Shrimp	7.01 - 7.27
Sauerkraut	3.30 - 3.60
Scallion	6.20 -
Scallop	6.00
Scotch Broth.	5.92
Sea Snail (Top shell)	6.00
Shad Roe, sauted	5.70 - 5.90

Shallots, cooked	5.30 - 5.70
Sherbet, raspberry	3.69
Sherry-wine	3.37
Shredded Ralston	5.32 - 5.60
Shredded Wheat	6.05 - 6.49
Shrimp	6.50 - 7.00
Shrimp Paste	5.00 - 6.77
Smelts, Sauted	6.67 - 6.90
Soda Crackers	5.65 - 7.32
Soup	
Broccoli Cheese Suop, condensed	5.60 -
Chicken Broth, rts.	5.80
Corn Soup, condensed	6.80
Cream of celery Saoup, condensed	6.20 -
Cream of Mushroom, condensed	6.00 - 6.20
Cream style corn, condensed	5.70 - 5.80
Cream of Potato soup, condensed	5.80 -
Cream of shrimp soup, condensed	5.80
Minestrone condensed	5.40
New England Clam Chowder, condensed	6.00 -
Oyster Stew, condensed	6.30 -
Tomato Rice Soup, condensed	5.50 -
Soy infant formula	6.60 - 7.00
Soy Sauce	4.40 - 5.40
Soy bean curd (tofu)	7.20
Soybean milk	7.00
Spaghetti, cooked	5.97 - 6.40
Spinach	5.50 - 6.80
Spinach, chopped	5.38 - 5.52
Spinach, cooked	6.60 - 7.18
Spinach, frozen, cooked	6.30 - 6.52
Spinach, pureed	5.50 - 6.22
Spinach, strained	5.63 - 5.79
Squash, acorn, cooked	5.18 - 6.49
Squash, Kubbard, cooked	6.00 - 6.20
Squash, white, cooked	5.52 - 5.80
Squash, yellow, cooked	5.79 - 6.00
Squid	6.00 - 6.50

Sturgeon	6.20
Strawberries	3.00 - 3.90
Strawberries, California	3.32 - 3.50
Strawberries, frozen	3.21 - 3.32
Strawberry Jam	3.00 - 3.40
Straw mushroom	4.90
Sweet Potatoes	5.30 - 5.60
Swiss Chard, cooked	6.17 - 6.78
Tamarind	3.00 -
Tangerine	3.32 - 4.48
Taro syrup	4.50
Tea	7.20
Three-Bean Salad	5.40
Tofu (soybean Curd)	7.20
Tomatillo (resembling Cherry tomatoes)	3.83
Tomatoes	4.30 - 4.90
Tomatoes, canned	3.50 - 4.70
Tomatoes, Juice	4.10 - 4.60
Tomatoes, Paste	3.50 - 4.70
Tomatoes, Puree	4.30 - 4.47
Tomatoes, Strained	4.32 - 4.58
Tomatoes, Wine ripened	4.42 - 4.65
Tomato Soup, Cream of, canned	4.62
Trout, Sea, sauted	6.20 - 6.33
Truffle	5.30 - 6.50
Tuna Fish, canned	5.90 - 6.20
Turnips	5.29 - 5.90
Turnip, greens, cooked	5.40 - 6.20
Turnip, white, cooked	5.76 - 5.85
Turnip, yellow, cooked	5.57 - 5.82
Vegetable Juice	3.90 - 4.30
Vegetable soup, canned	5.16
Vegetable soup, chopped	4.98 - 5.02
Vegetable soup, strained	4.99 - 5.00
Vermicelli, cooked	5.80 - 6.50
Vinegar	2.40 - 3.40
Vinegar, cider	3.10
Walnuts, English	5.42

Wax gourd drink	7.20
Water Chestnut	6.00 - 6.20
Watercress	5.88 - 6.18
Watermelon	5.18 - 5.60
Wheat Krispice	4.99 - 5.62
Wheatnena	5.85 - 6.08
Wheaties	5.00 - 5.12
Worcestershire sauce	3.63 - 4.00
Yams, cooked	5.50 - 6.81
Yeast	5.65
Yangsberries, frozen	3.00 - 3.70
Zucchini, cooked	5.69 - 6.10
Zwiebach	4.84 - 4.94

References:

1. Anon. 1962. pH values of food products. Food Eng. 34(3): 98-99.
2. Bridges, M. A., and Mattice, M.R. 1939. Over two thousand estimations of the pH of representative foods, American J. Digestive Diseases, 9:440-449.
3. Warren L. Landry and et al. 1995. Examination of canned foods. FDA Bacteriological Analytical Manual, 8th Ed. Chapter 21, Table 11, AOAC International, Gaithersburg, MD 20877
4. Grahn M.A. 1984. Acidified and low acid foods from Southeast Asia. FDA-LIB

Acidified and Low-Acid Canned Foods

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